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- d) at least a pair of contact pads applied in electrical communication with said resistive layer for electrical connection to a power source; and
 - e) an insulation layer applied over said resistive layer.

31. (Newly Added) The heater of claim 30, where said at least one resistive trace is a plurality of traces configured to optimize an axial thermal profile of the heater.

REMARKS

Claims 1-22 and 28-31 are pending, with Claims 1, 28, and 30 being independent. In this Preliminary Amendment, Claims 23-27 have been cancelled, Claims 1, 5, 6, and 28 have been amended, and Claims 30-31 have been newly added. Favorable reconsideration and allowance of the present application are respectfully requested.

Applicants thank the Examiner for the indication that Claims 10-12 contain allowable subject matter and for the courtesy of the interview conducted on November 20, 2002 with Applicants' representative. This Preliminary Amendment is being submitted in an earnest attempt to place the application in condition for allowance. If the Examiner believes that anything further is required in this regard, he is encouraged to contact Applicants' undersigned representative.

Claims 1 and 28 have been amended to include the feature that the resistive layer has at least one resistive trace in a pattern that is discontinuous circumferentially. New Claim 30 also includes this feature. Support for these amendments may be found in the drawings as originally filed, specifically, Figures 2c and 9.

Claims 5 and 6 have been amended to further clarify the relationship between the conductive traces and the resistive traces in one aspect of the invention.

New Claims 30-31 have been added to provide Applicants with an additional scope of protection commensurate with the disclosure. Support for new Claim 30 may be found in the drawings as originally filed, specifically, Figures 2c and 9. Claim 31 is supported by the disclosure on pages 18-19 of the specification.

No new matter has been added.

Claims 1-3, 8, 9, 14-19, 22, 28 and 29 were rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley. Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Schmidt. Claims 5-7 were rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Collins. Claim 13 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Goldwin. Claim 20 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Shipley. Claim 21 was

rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Bottari, et al. Applicants respectfully traverse these grounds of rejection.

Juliano, et al. relates to a cylindrical nozzle heater having a resistive layer that is applied using a fine line direct writing technique. The resistive layer is applied as a circumferentially continuous spiral that is disposed over the length of the cylindrical substrate. Juliano, et al. teaches away from the use of screen printing for non-flat substrates.

Riley relates to a switch that is screen printed on a flat substrate. No examples of non-flat substrates are provided.

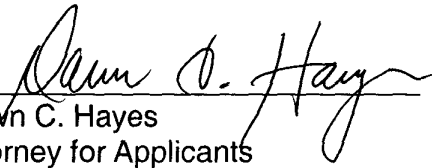
Collins relates to resistive elements applied to substrates by either of direct writing or screen printing. However, the only example of applying a resistive element to a non-flat substrate involves the use of direct writing a continuous spiral pattern that is applied over the length of the cylindrical substrate.

Applicants submit that the combination of Juliano, et al. and Riley, which Applicants do not concede may be properly combined, does not teach or suggest a heater as described in Claims 1 and 28, and in new Claim 30, that has a resistive layer with at least one resistive trace that is circumferentially discontinuous. Further combination with Collins and/or the other secondary references does not remedy this deficiency.

Accordingly, Applicants submit that this application is in condition for allowance, and respectfully request prompt issuance of a notice thereof.

Applicants' undersigned agent may be reached by telephone at (202) 625-3500. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


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MARK-UP VERSION OF THE CLAIMS

1. (Twice Amended) A thick-film electric heater, comprising:
 - a) a thermally conductive non-flat substrate surface;
 - b) a silk-screened dielectric layer applied on said substrate surface;
 - c) a resistive layer applied on said dielectric layer thereby forming a circuit for the generation of heat, the resistive layer having at least one resistive trace in a pattern that is discontinuous circumferentially;
 - d) at least a pair of silk-screened contact pads applied in electrical communication with said resistive layer for electrical connection to a power source; and
 - e) an insulation layer applied over said resistive layer.
5. (Amended) The heater of claim 1, where said resistive layer further comprises [a resistive trace and a] at least one low-resistance conductive trace in electrical communication with the at least one resistive trace, thereby forming an optimized heat generating pattern.
6. (Amended) The heater of claim 5, where said at least one resistive trace is silk-screened on said dielectric layer.
28. (Twice Amended) An injection mold runner nozzle having a co-axially disposed cylindrical heater comprising:

- a) a cylindrical, thermally conductive substrate having a smaller coefficient of thermal expansion than that of said nozzle, thereby causing said substrate to clamp onto said nozzle as said nozzle and said substrate heat up;
- b) a [silk-screened] dielectric layer applied on said substrate;
- c) a resistive layer applied on said dielectric layer thereby forming an electrical circuit for heat generation, the resistive layer having at least one resistive trace in a pattern that is discontinuous circumferentially around the substrate;
- d) at least a pair of [silk-screened] contact pads applied in electrical communication with said resistive layer for electrical connection to a power source; and
- e) an insulation layer applied over said resistive layer.